UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
ADDRESS: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO	CONFIRMATION NO
09/849,597	05/07/2001	Han Oh Park	024018-0111	8892

7590 02/27/2002

Stephen A. Bent
FOLEY & LARDNER
Washington Harbour
3000 K Street, N.W., Suite 500
Washington, DC 20007-5109

EXAMINER
CHUNDURU, SURYAPRABHA

ART UNIT	PAPER NUMBER
1637	

DATE MAILED: 02/27/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/849,597	Applicant(s) PARK ET AL.	
	Examiner Suryaprabha Chunduru	Art Unit 1637	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED. (35 U.S.C. § 133)
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 January 2002*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) *2* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

1. Applicant's election without traverse of claims 1, and 3-12 in Group I in Paper No. 9 is acknowledged.

2. Claims 1, 3-12 are considered for examination. Claim 2, being a non-elected claim, is withdrawn from further consideration.

3. The Information Disclosure statement (Paper No.7) filed on September 4, 2001 has been entered.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

a. Claims 1, 3, and 7-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ahern (USPN. 5,470,724) and in view of Sambrook et al. (Molecular Cloning, pages 8.11-8.33 and 15.14-15.19, 1989).

Ahern teaches a method for preparing and amplifying a population of DNA fragments wherein Ahern discloses that the method comprises (i) digesting a DNA into fragments which have single-strand cohesive ends by using a restriction enzyme, preparing a series of hairpin adaptors which have single-strand cohesive ends, enzymatically ligating the restricted DNA fragments to the adapters using a DNA ligase and amplifying the DNA fragments using DNA polymerase (see column 2, lines 16-67, column3, lines 1-2). Ahern also discloses that (i) the DNA ligase is T4 DNA ligase (see column 8, lines 8-25); and (ii) the DNA polymerase is Taq DNA polymerase (see column 8, lines 44-54). Further, Ahern teaches removal of hairpin loop adaptors by centricon-100 filters and single-strand-specific nucleases after amplification (see column 21, lines 5-41, and column 16, lines 46-62), however Ahern did not teach removal of hairpin adaptors after ligation by using an alkaline solution, or an RNase or a single strand specific exonuclease.

Sambrook et al. teach method for removal of hairpin structures using alkaline solution (see page 8-12, paragraph 2, page 8.31, paragraphs1-2), treatment with RNase (see 8.15, paragraph 3) and treatment with exonuclease III (see page 15.14, paragraph 4).

Therefore, it would have been prima facie obvious to a person of ordinary skill in the art at the time the invention was made, to modify a method of preparing and amplifying DNA fragments using adapters as taught by Ahern with the method of removing unligated secondary structures as taught by Sambrook et al. to achieve expected advantage of developing a method for preparing and amplifying DNA fragments using hairpin loop adapters because Ahern states that "subsequent DNA replication is allowed to proceed for a time sufficient for the DNA polymerase molecules to fully circumnavigate the closed loop structures. Such a time would

normally be slightly longer time, that would allowed for a DNA polymerase to at least travel past the region on the sequence of interest (SOI) complementary to the primer target site. Thus, the closed-loop structure containing SOI will become fully replicated and the closed –loop structures lacking SOI are not replicated. Thus, the closed-loop stuctures lacking the SOI retain their single-stranded loop portions after DNA replication" (see column 16, lines 31-46). One alternative favoring of replication or amplification, expressly motivated by Sambrook et al. is to use alkaline solution, or RNase or exonuclease to remove non-complementary sequences (hairpin loops) and to provide efficient fill-in of gaps by DNA polymerase in subsequent amplification step. An ordinary practitioner would have been motivated to combine the method of Ahern with the method of Sambrook et al. in order to achieve the expected advantage of developing a sensitive method for preparing and amplifying DNA fragments.

b. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ahern (USPN. 5,470,724) and in view of Sambrook et al. (Molecular Cloning, pages 8.11-8.33 and 15.14-15.19, 1989) as applied to claims 1, 3, 7-12 above, and further in view of Deugau et al. (USPN. 5, 508,169).

Ahern teaches a method for preparing and amplifying a population of DNA fragments wherein Ahern discloses that the method comprises (i) digesting a DNA into fragments which have single-strand cohesive ends by using a restriction enzyme, preparing a series of hairpin adaptors which have single-strand cohesive ends, enzymatically ligating the restricted DNA fragments to the adapters using a DNA ligase and amplifying the DNA fragments using DNA polymerase (see column 2, lines 16-67, column3, lines 1-2). Ahern also discloses that (i) the DNA ligase is T4 DNA ligase (see column 8, lines 8-25); and (ii) the DNA polymerase is Taq

DNA polymerase (see column 8, lines 44-54). Further, Ahern teaches removal of hairpin loop adaptors by centricon-100 filters and single-strand-specific nucleases after amplification (see column 21, lines 5-41, and column 16, lines 46-62). However Ahern did not teach removal of hairpin adaptors after ligation by using an alkaline solution, or an RNase or a single strand specific exonuclease and use of type IIs or IIip restriction enzymes.

Sambrook et al. teach method for removal of hairpin structures using alkaline solution (see page 8-12, paragraph 2, page 8.31, paragraphs1-2), treatment with RNase (see 8.15, paragraph 3) and treatment with exonuclease III (see page 15.14, paragraph 4).

Deugau et al. teach a method for preparing and amplifying nucleic acid molecules using indexing linkers wherein Deugau et al. disclose that the method comprises use of type IIs and IIip for digesting a DNA fragment to produce fragments with cohesive ends (see column 7, lines 34-64).

Therefore, it would have been prima facie obvious to a person of ordinary skill in the art at the time the invention was made, to modify a method of preparing and amplifying DNA fragments using adapters as taught by Ahern with a method of removing unligated secondary structures as taught by Sambrook et al. and a method of using type IIs and IIip restriction enzymes as taught by Deugau et al. to achieve expected advantage of developing a method for preparing and amplifying DNA fragments using hairpin loop adapters because Ahern states that "subsequent DNA replication is allowed to proceed for a time sufficient for the DNA polymerase molecules to fully circumnavigate the closed loop structures. Such a time would normally be slightly longer time, that would allowed for a DNA polymerase to at least travel past the region on the sequence of interest (SOI) complementary to the primer target site. Thus, the closed-loop

structure containing SOI will become fully replicated and the closed -loop structures lacking SOI are not replicated. Thus, the closed-loop stuctures lacking the SOI retain their single-stranded loop portions after DNA replication" (see column 16, lines 31-46). One alternative favoring of replication or amplification, expressly motivated by Sambrook et al. is to use alkaline solution, or RNase or exonuclease to remove non-complementary sequences (hairpin loops) and further, in combination with the use of type IIs and IIip restriction enzymes as taught by Deugau et al. to provide efficient fill-in of gaps by DNA polymerase in subsequent amplification step. An ordinary practitioner would have been motivated to combine the method of Ahern with the method of Sambrook et al. and Deugau et al. in order to achieve the expected advantage of developing a sensitive method for preparing and amplifying DNA fragments.

No claims are allowable.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Suryaprabha Chunduru whose telephone number is 703-305-1004. The examiner can normally be reached on 8.30A.M. - 4.30P.M, Mon - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Benzion can be reached on 703-308-1119. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-0294 for regular communications and - for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0196.

Suryaprabha Chunduru
February 21, 2002

JEFFREY FREDMAN
PRIMARY EXAMINER